survival among the patients with 1-3 brain metastases from non-small cell lung cancer.

EP-1210

Definitive Radiotherapy with or without chemotherapy for T4N0-1 Non-small Cell Lung Cancer

Y.J. Kim[1], S.Y. Song[1], S.Y. Jeong[2], S.W. Kim[3], J.S. Lee[3], S.S. Kim[1], W. Choi[4], E.K. Choi[1]

[1]*Asan Medical Center- Univ of Ulsan, Radiation Oncology, Seoul, Korea*

[2]*Asan Medical Center- Univ of Ulsan, Institute of Innovative Science, Seoul, Korea*

[3]*Asan Medical Center- Univ of Ulsan, Medical Oncology, Seoul, Korea*

[4]*Gangneung Asan Hospital, Radiation Oncology, Gangneung, Korea*

Purpose or Objective: To know the failure patterns and survival of T4N0-1 non-small cell lung cancer (NSCLC) treated with definitive radiotherapy.

Material and Methods: Ninety five patients with T4N0-1 NSCLC who received definitive radiotherapy with or without chemotherapy from May 2003 to Oct 2014 were retrospectively reviewed. Standard radiotherapy scheme was 66 Gy in 30 fractions. Main concurrent chemotherapy regimen was weekly Paclitaxel 50 mg/m2 combined with Cisplatin 20 mg/m2 or Carboplatin AUC 2. Primary outcome was overall survival (OS). Secondary outcomes were failure patterns and toxicities.

Results: The median age was 64 (range, 34-90). Eighty eight percent (n=84) of patients had ECOG performance status 0-1 and 42% (n=40) experienced pretreatment weight loss. Sixty percent (n=57) of patients had no metastatic regional lymph nodes. The median radiation dose was EQD2 67.1 Gy (range, 56.9-83.3). Seventy one patients (75%) were treated with concurrent chemotherapy. Among them, 13 patients were also administered neoadjuvant chemotherapy. At the median follow-up of 21 months (range, 1-102), 3-year OS was 44%. Three-year cumulative incidence of local recurrence and distant recurrence were 48.8% and 36.3%. Pretreatment weight loss and combination of chemotherapy were significant factors in OS. Acute esophagitis over grade 3 was occurred in 3 patients and only one grade 3 chronic esophagitis was reported. There was no grade 3-4 radiation pneumonitis.

Conclusion: Definitive radiotherapy for T4N0-1 NSCLC resulted in favorable survival with acceptable toxicity rates and local recurrence was a major pattern of recurrence. For improving local tumor control, the application of intensity modulated radiotherapy and radio-sensitizing agents would be needed.

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Prognostic factors in patients with Stage I NSCLC treated with 3-D noncoplanar conformal RT

K. Karasawa[1], K. Ito[1], Y. Shibata[1], S. Hayakawa[1], H. Tanaka[1], T. Shimizuguchi[1], Y. Machitori[1], M. Fujii[1], K. Nihei[1], K. Fuse[1], T. Kawamoto[1], H. Kuramoto[1]

[1]*Tokyo Metropolitan Komagome Hosp., Department of Radiology, Tokyo, Japan*

Purpose or Objective: Stereotactic Body Radiation Therapy has become one of the standard treatments in Stage I NSCLC. However, there exists the problem of reoxygenation for large tumors and BED for serial organs locating near the central lung. Therefore, we have been treating especially these cases by decreasing the fraction dose while increasing overall treatment time and total dose (so-called hypofractionated 3-dimensional noncoplanar conformal radiation therapy). To clarify the prognostic factors of this treatment method, we carried out this investigation.

Material and Methods: Eligibility criteria were as follows: maximum tumor diameter not greater than 5cm, PS between 0 and 2, and no limitation regarding age and pulmonary function. Radiotherapy was given with 6MV photon beam by fixed 10 non-coplanar conformal beams to a total dose of 75Gy in 25 fractions in 5 weeks. Irradiation was aiming at the ITV with proper margins. No ENI was given. Between Jan. 2002 and Jan. 2011, 109 eligible cases were treated. Age ranged from 53 to 93 (median 78). The male/female ratio was 79/30. There were 100 PS 1 and 9 PS 2 cases. There were 22 low risk operable cases, 31 high risk operable cases (surgeons recommended RT), and 56 inoperable cases. There were 63 T1 tumors and 46 T2. Forty-six cases were central tumors and the other 63 were peripheral tumors. Seventy tumors were adenocarcinoma, 23 tumors were squamous cell carcinoma, and 16 others. Regarding tumor markers, pretreatment CEA was elevated (>5ng/ml) in 36 cases. Using these 8 parameters, multivariate analysis (MVA) for overall survival (OS) and local control (LC) was performed by Cox's Proportional Hazard Model. Median follow-up period was 67 months.

Results: Five-year LC and OS rates were 84% and 50%, respectively. As for LC, MVA revealed that histology (p=0.0279) was prognostic and PS (p=0.0541) and pretreatment CEA (p=0.0560) had a tendency. As for OS, MVA revealed that gender (p=0.0081) and pretreatment CEA (p=0.0189) were prognostic and operability (p=0.0520) and histology (p=0.0913) had a tendency. On the other hand, age, T-stage or tumor location was not prognostic regarding neither LC nor OS.

Conclusion: Our overall results of this method were promising considering the status of the patients. Regarding LC, adenocarcinomas were better controlled compared with other histologies, and patients with good PS and tumors with normal pretreatment CEA tended to be better controlled. Regarding OS, female patients, patients with normal pretreatment CEA survived better than their counterpart, and operable cases and adenocarcinoma cases tended to survive better than their counterpart, respectively. Unlike other reported series, T2 stage and central tumors did not carry worse prognoses with this treatment method.

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Are the encouraging SABR results for NSCLC reproducible outside of pioneering academic institutions?

C. Peedell[1], E. Aynsley[1], D. Shakespeare[1], J. Green[1], P. Summers[1], J. Reynolds[1], K. Burke[1], H. Bayles[1], C. Huntley[1], N. Richmond[1]

[1]*The James Cook University Hospital, Radiotherapy and Oncology, Middlesbrough, United Kingdom*

Purpose or Objective: Stereotactic ablative radiotherapy (SABR) is an internationally accepted standard of care in the management of early stage medically inoperable NSCLC [1]. However, the issue of whether the excellent results of SABR for lung cancer can also be achieved when patients are treated outside pioneering academic institutions remains a pertinent one [2]

South Tees NHS Trust is a large general hospital with a non-academic cancer centre, serving a population of 1.1 million in the North-East of England. In 2009, we became the first non-academic cancer centre in the UK to establish a SABR programme. To date, over 200 patients have been treated with SABR.

We present outcome data of 167 patients with Stage IA-IIB lung cancer, all of whom have at least 6 months of follow up and CT assessment of response.

Material and Methods: Data was collected prospectively between Sept 2009 – Sept 2015. Only patients with stage IA-IIB histologically proven NSCLC or PET +ve growing lesions, and at least 6 months of follow up, were included in the analysis. All patients were treated according to local protocols based on the national guidelines of the UK SABR Consortium.The following risk adapted treatment schedules were used depending on size and location of the tumour: 54Gy in 3 fractions (40patients), 55Gy in 5 fractions (105pts), 60Gy in 8 fractions (15pts), or 50Gy in 10 fractions (7pts)

Follow up was with CXR at 6months followed by CT at 6 months and clinical follow up, 3 monthly.

Results: 167 patients with stage IA-IIB disease treated. 55% histologically proven.There were 4 (2.4%) radiologically confirmed local recurrences giving a local control rate of 97.6%. Median survival was 43.2months. 3 year Overall Survival was 56.4% (see Fig 1). Treatment was well tolerated with minimal G3 toxicity (5 patients).

Conclusion: Our results suggest that SABR for medically inoperable NSCLC can be safely and effectively implemented in a non-academic institution with appropriate equipment and training.Clinical outcomes are comparable with internationally published series [3}, with encouraging 3yr OS rate of 56%. Toxicity is minimal. Longer term follow-up is required to confirm findings and provide data regarding long-term toxicity.

References:

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Changes in pulmonary function after single-fraction carbon-ion radiotherapy for stage I NSCLC

W. Takahashi[1], N. Yamamoto[2], M. Nakajima[2], M. Karube[1], H. Yamashita[1], K. Nakagawa[1], H. Tsuji[2], T. Kamada[2]
[1]*University of Tokyo, Department of Radiology, Tokyo, Japan*
[2]*National Institute of Radiological Sciences, Research Center Hospital for Charged Particle Therapy, Chiba, Japan*

Purpose or Objective: In patients with inoperable stage I non-small cell lung cancer (NSCLC) or for those refusing surgery, stereotactic body radiotherapy and particle radiotherapy have become therapeutic options. We conducted a Phase I/II study on single-fraction carbon ion radiotherapy (SF-CIRT) for stage I NSCLC that yielded a 3-year survival rate of 75.5% for 218 patients. Until now, the effect of hypofractionated CIRT on pulmonary function (PF) has not been well documented. The purpose of this study was to assess the long-term impact of SF-CIRT on PF in stage I NSCLC patients.

Material and Methods: A review of prospectively collected data from SF-CIRT-treated patients was performed. Patients underwent PF tests (PFT) (or: underwent a PF test) immediately before, and at 6, 12, and 24 months after irradiation. Patients who relapsed or needed adjuvant treatment were excluded as these events might affect PF.

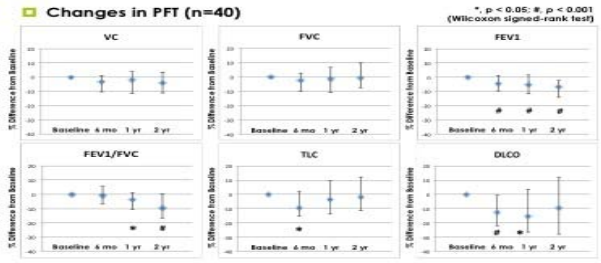
Results:

Patient characteristics (n = 40)

Median age		75 (51-89)
Male/Female		26 / 14
Stage	T1 (IA)/T2 (IB)	25 / 15
Histology	Adeno./Squamous/NSCLC	30 / 9 / 1
Location	Left upper/Lower	12 / 11
	Right upper/Middle/Lower	9 / 2 / 6
Medical inoperability		19 (47.5%)
COPD*		13 (32.5%)
Dose prescription	44/46/48/50 GyE in single fraction	13 / 12 / 6 / 9

* FEV1/FVC ratio <70%

Forty patients treated between 2007 and 2012 fulfilled the inclusion criteria. According to the dose escalation study protocol, a median prescribed single-fraction dose of 46 GyE (range, 44-50 GyE) was delivered. All treatment-related complications were self-limited, without any grade 3-5 toxicities. Two years post-CIRT, the mean values of forced expiratory volume in 1 sec (FEV1) [-8.4% ± 11.9% ($p < 0.001$)] and the FEV1 per unit of forced vital capacity (FEV1/FVC) [-8.9% ± 11.7% ($p < 0.001$)] were less than the pre-CIRT values. There were no significant overall changes in total lung capacity, vital capacity, FVC, and residual volume before SF-CIRT and 2 years after SF-CIRT. At 6 months post-treatment, the diffusion capacity of the lung for carbon monoxide (DLCO) was significantly less than the pretreatment value (86.7 ± 32.7% vs. 78.1 ± 31.1%; $p = 0.002$); however, at 24 months post-treatment, the mean DLCO recovered to pretreatment levels (86.9 ± 30.5%). This might have been due to recovery from non-symptomatic radiation pneumonitis and/or smoking cessation.



Conclusion: We found stage I NSCLC patients had good long-term preservation of PF after SF-CIRT. Follow-up PFT revealed the following: Declines in FEV1 and FEV1/FVC were statistically significant but clinically trivial, DLCO decreased temporary, thereafter it tended to recover to pretreatment levels within 2 years.

EP-1214

Radiotherapy as adjuvant or definitive treatment method in thymic tumours

A. Napieralska[1], L. Miszczyk[1]
[1]*Maria Sklodowska-Curie Memorial Cancer Center and Institute of Oncology, Radiotherapy Department, Gliwice, Poland*

Purpose or Objective: An evaluation of thymic tumors patient radiotherapy results.

Material and Methods: 93 patients (54F [58%], 39M [42%]) aged from 3 (6 children) to 77 (median 48) treated for thymic tumors since 1981. 84 patients (90%) were diagnosed with thymoma, 9 (10%) with thymic carcinoma. Masaoka stage was assessed in 93% (56% stage II, 31%-III, 6%- IV). All patients were irradiated. In 76 cases radiotherapy (RT) followed surgery – in 41 patients after radical and in 35 after incomplete resection. In 17 cases RT was definitive treatment, combined in 14 patients with chemotherapy. Patients were irradiated with fraction dose of 1.1-4.0Gy (median 2.0) to the total dose of 20-68Gy (median 49.5). Patient- and treatment-related factors potentially affecting survival and local control (LC) were evaluated with log-rank test. Survival analysis was performed with Kaplan-Meier method.

Results: Tumors relapsed in 17 patients. Metastases occurred after 6-129months (median 10.1) in 12 patients (in 8 in lungs). During the follow-up 17 patients died due to progression(13) or recurrence(4) of the disease. Median overall survival (OS) in the whole group (since diagnosis) was 140.2months. OS was significantly longer in patients with WHO B1 type(p=0.02), in good performance status (PS)(p=0.0005), without radiation-induced pulmonary fibrosis(p=0.02) or second cancer(p=0.03). Difference in OS between patients treated with radical surgery+RT, non-radical surgery+RT and definitive RT was of borderline significance(p=0.065). Factors significantly decreasing LC were: male sex(p=0.04), WHO B2 type(p=0.01), bad PS(p=0.0007), presence of metastases(p=0.003) and second cancer(p=0.03).